



Environment

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Granville Solvents Superfund Site 2012 Annual Groundwater Monitoring Report

Granville Solvents Site
Granville, Licking County, Ohio

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1.0 Introduction

AECOM has prepared this annual groundwater monitoring report for sampling conducted during Calendar Year 2012 at the Granville Solvents Site (Site) in Granville, Licking County, Ohio (Figure 1). The report was prepared on behalf of the Granville Solvents Site Removal Management Group, LLC (the Group) to fulfill monitoring requirements of the Administrative Order on Consent (AOC) issued by the United States Environmental Protection Agency (USEPA) on September 7, 1994 for the Granville Solvents Site. Section V(2)(f) of the AOC requires groundwater performance monitoring until a Notice of Completion is issued for the AOC. Performance monitoring was originally defined in the *Proposal to Suspend Groundwater and Soil Treatment System Operation and Commence Post-Shutdown Groundwater Monitoring at the Granville Solvents Site*, (M&E 2004) and was subsequently modified by the Post-Shutdown Contingency Plan (Contingency Plan) dated January 31, 2005.

The Contingency Plan includes a groundwater monitoring program focused on monitoring the potential migration of specific volatile organic compounds (VOCs) that might occur once the treatment of groundwater and soils was suspended in March 2005. This monitoring program consisted of semi-annual sampling of eight (8) designated wells over a five year period (2005 to 2010). Collected samples have been analyzed for VOCs following the procedures outlined in the *Groundwater Monitoring Program Plan for the Granville Solvents Site in Granville, Ohio* (M&E 1995) (Groundwater Monitoring Plan).

After the 2005 to 2010 monitoring period outlined in the Contingency Plan was completed, a Draft Removal Action Completion (RAC) Report dated July 30, 2010 was submitted to the USEPA in order to apply for a Notice of Completion (NOC) regarding removal actions and post-shutdown monitoring. USEPA review of comments dated April 6, 2012 requested continued annual (groundwater) monitoring for a minimum of two years (semi-annually through 2012).

This report contains the results of groundwater sampling conducted in May and November of Calendar Year 2012 and an evaluation of groundwater quality relative to historic results and current trigger levels outlined in the Contingency Plan. This report also contains potentiometric surfaces measured in May and November 2012, as well as a report of other site activities conducted during Calendar Year 2012.

2.0 Background

2.1 Response Actions

The AOC required completion of certain removal actions at the Site. Those removal actions were defined by the following orders in Section V(2)(e-g) of the AOC:

1. By December 20, 1994, install and run a groundwater extraction and treatment system which shall halt the migration of groundwater contamination (originating from the Site) toward the Village of Granville municipal well-field (Granville Well-field). Treat and discharge all extracted water.

2. Implement action which is necessary to ensure that any water contaminated with any contamination (originating from the Site) that enters the Granville Well-field drinking water supply meets all risk-based and all applicable federal and state drinking water standards. Such action may include utilization of, modification to, and/or addition to the Granville Well-field drinking water supply system.
3. Design, install, and operate a groundwater extraction and treatment system which shall halt the migration of groundwater contamination (originating from the Site) toward the Granville Well-field and shall treat all groundwater within the contamination plume originating from the Site to no further action levels which assure protection of human health and the environment and attain all risk-based standards and federal and state ARARs.
4. Treat the soils at the Site to levels which will assure protection of human health and the environment to levels which will attain all risk-based standards and federal and state ARARs, and to levels which will assure, to the maximum extent practicable, that no groundwater beneath the soils will become contaminated above the groundwater no further action levels. Soil "no further action" levels were defined in the Engineering Evaluation /Cost Analysis Report (EE/CA)(M&E 1999).

The Group has completed the following Removal Actions at the Site:

1. Installation and operation of a groundwater extraction and treatment system that operated on a continuous basis from December 1994 through March 2005. The system halted migration of contaminated groundwater from the Site and reduced the mass and size of the plume to meet the obligations established in the AOC.
2. Supply well PW-4 was installed in the Granville Well-field to replace [capacity of] PW-1.
3. VOCs in groundwater at the Granville Well-field and at monitoring wells between the source area and the Granville Well-field have been reduced to levels at or below no further action levels.
4. A soil treatment system was installed and operated between 2001 and 2005.

The Group submitted a proposal and Contingency Plan to USEPA and Ohio EPA to suspend groundwater and soil treatment and monitor groundwater quality for a 5-year period from March 2005.

2.2 Site Hydrogeology

The Conceptual Site Model (CSM) developed in the EE/CA concluded that the hydrogeologic setting for Raccoon Creek valley is a highly productive buried-valley aquifer with Raccoon Creek flowing generally to the east ultimately discharging into the Licking River. Groundwater gradients are typically low (only a few tenths of a foot difference in elevation) across the Site with a groundwater divide typically observed between the Site and the Granville Well-field.

The Site is located on the northern margin of the buried valley at a point where the valley narrows. In the absence of any local pumping, the regional gradient would be from west to east, with contributing recharge from the bedrock into the valley. Monitoring well GSSMW-06 encountered the bedrock at the bottom of the boring confirming bedrock information from the Ohio Department of Natural

Resources (ONDR). Groundwater levels in this well are typically higher than the other Site wells within the buried valley, which confirms the CSM concept of recharge from the valley walls. The proximity of the Site to the northern margin of the valley and the geometry of the overall valley narrowing adjacent to the Site support a slight groundwater divide between the Site and Granville Well-field. This slight divide is further enhanced by local withdrawals from the Granville Well-field pumping wells west of the Site. Even with the groundwater extraction system suspended for the past 7 years, the divide appears to generally be present.

Groundwater measurements recorded during the last 7 years show that the Site and surrounding area typically experiences seasonally high water levels during the early part of the year and seasonally low water levels during the fall. The rise in the water level during the spring coupled with groundwater usage of the area during the summer months typically causes the groundwater direction to temporarily change from south to north; however, the divide appears to remain between the Site and the Granville Well-field during the shift in flow direction.

3.0 Contingency Plan

Main components of the Contingency Plan consist of the groundwater monitoring plan and Trigger Level definition. The groundwater monitoring plan consists of semi-annual monitoring of specific wells of the monitoring well network as follows:

1. Source Area Wells: MW-P1, MW-2D, MW-4D and MW-6;
2. Intermediate Well: GSSMW-15;
3. Leading Edge Wells: MW-7D and MW-8; and
4. Compliance Wells: GSSMW-8 and GSSMW-9.

Trigger Levels were developed to activate response actions that may result from trend analysis of Leading-Edge Wells and Compliance Wells. Exceeding Trigger Level concentrations would require immediate action to restart components of the existing treatment systems as follows:

- Leading Edge Wells – If the concentration of any VOC in a sample collected from MW-7D or MW-8 is greater than twice the MCL, groundwater treatment will be reinstated to retard the migration of the plume toward the Granville Well-field drinking water wells and reduce contaminant levels.
- Compliance Well - If the concentration of any VOC meets or exceeds the MCL in a sample collected from monitoring well GSSMW-8 and GSSMW-9, groundwater treatment will resume in order to reduce the concentrations to levels below respective MCLs.

Sampling events completed to date under the Contingency Plan include:

- 2005 - August;
- 2006 - May and July;

- 2007 - May and September;
- 2008 - April and September;
- 2009 - March and September;
- 2011 - May and November; and
- 2012 - May and November

Groundwater level measurements were collected quarterly in 2006 and 2007 and semi-annually thereafter to document the change of the potentiometric surface following system shutdown.

4.0 Methods

4.1 Maintenance and Repairs

4.1.1 Monitoring Well GSSMW-9

On May 22, 2012, the PVC well riser for GSSMW-09 was extended (0.6ft) via a rubber coupler. Prior to this, the well casing for GSSMW-09 was deep within the well box and had become partially buried by surface water and sediment from drainage. Following the repair, GSSMW-09 was redeveloped on the same day. Redevelopment consisted of surging with a 2-inch QWD™ 200 (Well Developer) attached to half-inch threaded PVC pipe followed by purging with a stainless steel Proactive Hurricane™ pump until the water was clear or about 40 gallons of water.

4.1.2 Removal of Dedicated Sampling Pumps

Grundfos™ dedicated sampling pumps and tubing in each of the nine wells sampled for the semi-annual event had been observed in 2011 to be in poor condition and several were not functional. The seals on most of the wellhead manifolds were in poor condition, potentially causing any surface water entering the flush-mount boxes to enter the well casing. For this reason, the dedicated pump and tubing systems were removed prior to the May 2012 semi-annual monitoring in order to conduct low-flow sampling at the following monitoring wells:

- MW-02D
- MW-04D
- MW-06
- MW-07D
- MW-08
- MW-P1
- GSSMW-15
- GSSMW-08; and
- GSSMW-09.

On May 22, 2012, AECOM removed the dedicated sampling pumps and tubing at each of the nine semi-annual monitoring wells and replaced the top of the casing with a standard water-tight cap. The pumps and tubing were labeled and are currently stored in the on-site remediation enclosure.

4.1.3 Stream Gauge Location

Between the May and November 2012 sampling events, the former stream gauge marker which consisted of a ½-inch diameter PVC riser about 4 ft high was destroyed and no longer present. Measurements of stream elevation are now obtained adjacent to the Cherry Street Bridge pier as shown on Figure 3.

4.2 Groundwater Sampling

Methods used to conduct the second semi-annual groundwater monitoring event in May and November 2012 are outlined in the Groundwater Monitoring Plan except for modification of the groundwater purge and sampling technique as outlined in the Procedure Change Notification letter submitted to USEPA on May 8, 2012 (Appendix A). The semi-annual monitoring wells were sampled in 2012 using low-flow techniques via an air operated bladder pump during each well sampling event. The bladder system consists of a 1.75-inch stainless steel QED™ bladder pump operated by a combined pump controller/12-volt air compressor (QED™ MP50). New disposable polyethylene bladders and tubing were used in between each well and the pump was thoroughly decontaminated using a Liquinox™/distilled water wash followed by distilled water rinse.

The monitoring well network used to monitor the groundwater conditions at the Site consisted of the existing wells MW-P1, MW-02D, MW-04D, MW-06, MW-07D, MW-08, GSSMW-08, GSSMW-09, and GSS-MW15. All Site monitoring wells were used to gauge groundwater depth to assist in determining the potentiometric surface.

The 2012 routine site activities are summarized below.

May 2012

- Recorded water level measurements of all site monitoring wells;
- Performed the site inspection; and
- Sampled select monitoring wells.

November 2012

- Recorded water level measurements of all site monitoring wells;
- Performed the site inspection; and
- Sampled select monitoring wells.

Inspection and gauging of the monitoring wells, purging, groundwater sampling and management of purge water typically varied from two to three days. Groundwater samples were submitted to TestAmerica Laboratories, Inc. in Savannah, Georgia for analysis of VOCs by USEPA SW-846 Method 524.2 in accordance with the Groundwater Monitoring Plan.

5.0 Results

5.1 Potentiometric Surface

Groundwater level measurements were collected during 2012 in conjunction with the semi-annual sampling event May 29 and November 12, 2012. Water level measurements are provided on Table 1 of this report and indicate that the average water level decreased approximately 2.0 feet from May to November. This seasonal decrease in over-all water levels is consistent with historic measurements since post shut-down monitoring (2005), and as noted in previous annual reports. This seasonal decrease is likely due to seasonal variations in precipitation, groundwater usage and changes in river levels.

Figures 2 and 3 of this report provide a depiction of the potentiometric surface for the May 2012 and November 2012 sampling events, respectively. The May 2012 map indicates that the potentiometric surface is very flat with a slight groundwater flow direction in the vicinity of the Site north and away from Raccoon Creek with a low average horizontal gradient of 0.005 ft/ft. The groundwater divide between the Site and the Granville Well-field is present. The November 2012 map indicates that the potentiometric surface exhibits a more pronounced divide between the Site and the Granville Well-field with a low gradient (0.004 ft/ft) away from Raccoon Creek in a northeast direction east of GSSMW-15 and a northwest direction west of GSSMW-15. This low-gradient flow reversal away from Raccoon Creek has typically been observed in the fall season since the 2005 post shut-down monitoring period, but was also observed in the Spring sampling event in 2012.

5.2 Groundwater Sampling

Purging data obtained for each monitoring well sampled is provided on Table 2. A summary of the groundwater analytical results for each monitoring wells sampled is provided on Table 3 with historic data and concentration trend graphs for selected monitoring wells provided in Appendix B. Appendix C provides iso-concentration contour lines for PCE, TCE and TCA for the 2012 May and November sampling events. The full analytical reports for groundwater testing with quality assurance/quality control documentation are provided in Appendix D.

5.2.1 Source Area Wells

Appendix B contains concentration trend graphs for detected VOCs on a logarithmic scale versus time on a linear scale beginning in 1996 for monitoring wells MW-P1, MW-2D, MW-4D, and MW-6. In general, the November 2012 results for the Source Area Wells are consistent with the May 2012 results with an increase in most concentrations of VOCs. The highest PCE levels at the site have historically been encountered at Source Area Well MW-2D and are currently the highest of the Source Area Wells at 190 micrograms per liter (ug/L). TCE levels at MW-2D decreased from 350 ug/L to 320 ug/L from May to November 2012.

The iso-concentration contour lines for PCE, TCE and TCA for the 2012 May and November sampling events provided in Appendix C indicate no major changes in the plume areas or location for each VOC other than a slight increase in the size of the PCE plume area and a slight shift of the TCA plume area eastward within the source area of the site.

5.2.2 Intermediate Well

GSSMW-15 was installed in September 2005 between the Source Area Wells and the Leading Edge Wells. Both PCE and TCE are slightly above the MCL of 5 ug/L with levels for both PCE and TCE slightly increasing between the May 2012 and November 2012 sampling events.

5.2.3 Leading Edge Wells

VOCs have never been detected at Leading Edge Well MW-07D and were not detected during the May or November 2012 sampling events. Cis and Trans DCE have typically been detected at MW-08 and were also detected during the May and November 2012 sampling events, and at higher levels than 2011 at 70 and 8.2 ug/L, respectively. These levels are below the Contingency Plan trigger levels of twice the MCL for cis-DCE (140 ug/L) and twice the MCL for trans-DCE (200 ug/L).

5.2.4 Compliance Wells

VOCs were not detected at compliance wells GSSMW-08 or GSSMW-09 during the May and November 2012 sampling events.

6.0 Conclusions

Concentrations of detected VOCs observed in both Compliance Wells and Leading Edge Wells have remained below the Contingency Plan trigger levels for both the May and November 2012 sampling events. VOC concentrations within the VOC source area were stable between May and November 2012 sampling events with a slight bias toward increasing concentrations of most VOCs. Based on the 2012 sampling results, it appears that the slight rebound in VOC concentrations that have occurred since the 2005 shut-down have currently stabilized.

The groundwater flow divide typically observed between the Site and the Granville Well-field was observed during the May and November 2012 sampling events with flow direction away from Raccoon Creek observed during both events.

7.0 References

- Metcalf & Eddy, 1995. Groundwater Monitoring Program Plan for the Granville Solvents Site in Granville, Ohio, Revised July 25, 1995.
- Metcalf & Eddy, 1999. Engineering Evaluation / Cost Analysis Report (EE/CA), August 1999.
- Metcalf & Eddy, 2004. Proposal to Suspend Groundwater and Soil Treatment Systems Operations and Commence Post-Shutdown Groundwater Monitoring at the Granville Solvents Site, August 2004.
- Metcalf & Eddy, 2005. A Contingency Plan for the Proposal to Suspend Groundwater and Soil Treatment System Operation and Commence Post-Shutdown Groundwater Monitoring at the Granville Solvents Site, January 2005.